



Climatic Variability

Impacts on Agriculture and Allied Sectors

editors

Mrinmoy Datta
Dhiman Daschaudhuri
S V Ngachan



Climatic Variability

Impacts on Agriculture and Allied Sectors

M. Datta

ICAR Research Complex for NEH Region
Tripura Centre, Tripura

D. Daschaudhuri

ICAR Research Complex for NEH Region
Tripura Centre, Tripura

S.V. Ngachan

ICAR Research Complex for NEH Region
Umiam Centre, Meghalaya



NEW INDIA PUBLISHING AGENCY

New Delhi – 110 034



NEW INDIA PUBLISHING AGENCY

101, Vikas Surya Plaza, CU Block, LSC Market

Pitam Pura, New Delhi 110 034, India

Phone: + 91 (11)27 34 17 17 Fax: + 91(11) 27 34 16 16

Email: info@nipabooks.com

Web: www.nipabooks.com

Feedback at feedbacks@nipabooks.com

© **Editors, 2014**

Citation: Datta M (mdatta2@rediffmail.com, mdatta54@gmail.com), Daschaudhuri D (dhiman.neh@gmail.com) and Ngachan SV (svngachan@rediffmail.com) 2014, Climatic Variability: Impacts on Agriculture and Allied Sectors.

ISBN: 978-93-81450-94-9

All rights reserved, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the publisher or the copyright holder.

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the author/s, editor/s and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The author/s, editor/s and publisher have attempted to trace and acknowledge the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission and acknowledgements to publish in this form have not been taken. If any copyright material has not been acknowledged please write and let us know so we may rectify it, in subsequent reprints.

Trademark notice: Presentations, logos (the way they are written/presented), in this book are under the trademarks of the publisher and hence, if copied/resembled the copier will be prosecuted under the law.

Composed, Designed and Printed in India

Contents

Foreword by Dr. S. Ayyappan v

Foreword by Dr. L.S. Rathore vii

Preface ix

Contributors xi

Section A: Weather and Agromet Services

1. Impact of Climate Change: Vulnerability, Mitigation and Adaptation – With Special Reference to Northeast India 1

U.C. Sharma and Vikas Sharma

2. Resilient Agriculture in the Context of Climate Change 11

M. Datta, D. Daschaudhuri and S.V. Ngachan

3. Probability Distribution Model of Weather Spells and Weather Cycles: A Case Study 33

Debashis Bhowmik, Banjul Bhattacharyya

4. Weather Based Agromet Advisory Services: An Improved Tool to Mitigate Climate Change Impact on Crops 43

Shilpa, C.N., Pavithra, B.V., Padmashri, H.S., Rajegowda, M.B and N.A. Janardhana Gowda

5. Climate Change Threatens Food Crops Across the World: An Overview 49

Md. Hedayetullah, C.K. Kundu, and Serajul Islam

Section B: Pest and Diseases

6. Climate Change and Integrated Pest Management 61

M Premjit Singh

7. Effects of Weather Parameters on the Population Dynamics of Insect Pest of Rice: A Case Study 75

K A Pathak, Boopathi T, Santosh Kumar, Y Ramakrishna and Nitin Singh

8. Climatological Influences in Occurrence of Pest with Special Emphasis to NE India	81
<i>Subrata Biswas</i>	
9. Integrated Disease/Pest Management in Plantation Crops	91
<i>Amar Bahadur and Sukhen Chandra Das</i>	
10. Climate Change and Effectiveness of Pesticides in Vegetable Crops	101
<i>D. Sharmah, A.K. Singh and M. Datta</i>	
11. Efficacy of <i>Beauveria bassian</i> (Balsamo) Vuillemin - A Potential Entomopathogen against Rice Hispa (<i>Diuraphis armigera</i> Olivier)	111
<i>K.C. Puzari, Pranab Dutta, L.K. Hazarika , and P. Das</i>	
12. Mulberry Diseases and Pest Control Measures	125
<i>T.K. Chakma, B.C. Debbarma, D. Saha and S. Chakraborty</i>	
13. Role of Fungal Pathogens as Biological Agents of Rice Pests in Changing Climatic Condition	147
<i>Pranab Dutta, S. Kalita, K.C. Puzari and L.K. Hazarika</i>	

Section C: Climatic Influences Over Agricultural and Horticultural Crops

14. Climate Influences on Potato Cultivation	165
<i>Pulak Chaudhuri</i>	
15. Climatic Requirements for Horticultural Crops with an Approaches to Forecast of Yield & Disease-Insect Occurrence	175
<i>Biswajit Das</i>	
16. Climatic Assessment for Alternate Land Use Plan of Flood Affected Areas: An Observation	199
<i>Britan Rahman, Pranab Dutta and Dipak Nath</i>	
17. Biodiversity in Mushroom	207
<i>Jai Prakash Sharma</i>	
18. Absorption of Photosynthetic Active Radiation (PAR) and its Effect on Growth Processes and Yield of Wheat Under Different Dates in the Gangetic Plains of Eastern India	237
<i>Rajib Nath, Mausumi Parya, D. Majumder, Sarika Jena and P.K Chakraborty</i>	
19. Stress Impact Assessment of <i>Brassica</i> spp Under Different Dates of Sowing and Irrigation Level	241
<i>Swaraj Kumar Dutta, Rajib Nath, G. Sounda, D. Majumder and P.K. Chakraborty</i>	

Section D: Climatic Influences Over Animal Husbandry and Fisheries

20. **Amelioration of Summer Infertility in Livestock** 245
B.S. Prakash
21. **Poultry Disease with Respect to Climatic Variability and their Suitable Remedial Measures** 255
R.N. Chatterjee and M.R. Reddy
22. **Climate Change and Its Impact on Livestock Production Performance** 263
Chander Datt, Ajay Kumar, Monica Puniya, S.S. Kundu and Tapan K. Das
23. **Reproductive Biology of the Catfish *Ompok bimaculatus* (Bloch, 1794) Related to the Affects of Climate Change** 273
Samir Malla, Pritam Goswami and S. Banik
24. **Climate Change and Aquatic Resources: Issues and Challenges** 285
Ratan K. Saha
25. **Impact of Climate Change on Fish Diseases and Immune Response and Some Control Methods for Common Diseases for Mitigation** 311
Lopamudra Sahoo, C. Debnath, J. Parhi and M. Datta
26. **Prediction of *Haemonchus contortus* Infections in Goats in a Subtropical Hill Area—A Preliminary Study** 321
R. Laha, M. Das and A. Goswami

Section E: ICT Application in Agriculture

27. **Disease Prediction Models – Development and Validation** 327
Suseelendra Desai
28. **Comparative Study of Hit-ratio (Accuracy Percentage) of Rice Blast Forecasting using Various Forecasting Models Based on Different Statistical Techniques: A Case Study** 341
R. Bhagawati, Kaushik Bhagawati, G. Bhagawati, U.D. Singh, S. Baruah and S.P. Singh
29. **Useful Softwares for Climate Change Research** 353
Roop Singh Maitry, Hemavati R., M. Datta and D. Daschauthuri
30. **Disease Forecasting Models: Their Role in Agriculture and Climate Change** 363
Hemavati, R., Roop Singh Maitry, B.L. Meena, M. Datta and D. Daschauthuri

Climatic Variability

Impacts on Agriculture and Allied Sectors

Readership : Professionals, researchers in the field of Environment, climate change, agriculture, veterinary sciences, horticulture, fisheries and natural resources management.



The book is been divided into 5 major categories :

- **Weather & Agromet Service**
- **Pest & Diseases**
- **Climatic influences over Agriculture & Horticultural crops**
- **Climatic influences over Animal Husbandry and Fisheries**
- **ICT application in Agriculture**

The book covers the detail information on the probable impacts of climatic variability on various agricultural and horticultural crops with pest and disease incidences and their remedial measures. The effect of climate change in animal husbandry sector particularly summer infertility, productivity and disease spectrum is elucidated in a lucid and practical way. Fisheries both inland and marine are also taken into account considering fish productivity and disease incidence. Forewarning models with weather forecast are also described in the book with special emphasis to develop a strategy for Resilient Agriculture. ICT application in Agriculture has also found a place in the book, which is a compendium of the entire gamut of the potential impacts on Agriculture and allied sectors thus suggesting the ways to combat weather vagaries.

Mrinmoy Datta : Joint Director, ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799 210

Dhiman Daschaudhuri : Agromet Advisory Services, ICAR Research Complex for NEH Region, Tripura Centre, Lembucherra – 799 210

S V Ngachan : Director, ICAR Research Complex for NEH Region, ICAR. Umiam, Meghalaya



NEW INDIA PUBLISHING AGENCY

101, Vikas Surya Plaza, CU Block, L.S.C. Market

Pitam Pura, New Delhi-110 034, India

Tel. : +91(11) 27341717, Fax : +91(11) 27341616

E-mail : info@nipabooks.com

Web : www.nipabooks.com

ISBN 9789381450949



9 789381 450949